Amendments to the Claims

The following listing of claims will replace all prior versions, and listings, of claims in the ancestor application.

1. (Currently Amended) A method for processing a speech signal, comprising:

receiving an input speech signal;

constructing a phoneme lattice for the input speech signal;

<u>determining vertices and arc parameters of the phoneme lattice for the input speech signal;</u>

searching the phoneme lattice to produce a likelihood score for each potential path; and

determining a processing result for the input speech signal based on the likelihood score of each potential path;

wherein constructing the phoneme lattice includes:

segmenting an input speech signal into frames,

extracting acoustic features for a frame of the input speech signal,

determining K-best initial phoneme paths leading to the frame based on a first score of each potential phoneme path leading to the frame, and

calculating a second score for each of the K-best phoneme paths for the frame.

2. (Cancelled)

3. (Currently Amended) The method of claim 1, <u>wherein determining vertices and arc parameters of the phoneme lattice comprises:</u> ~~further comprising~~:

clustering together K-best initial phoneme paths for at least one consecutive frame; <u>and</u>

selecting M-best refined phoneme paths among the clustered phoneme paths based on second scores of these paths; ~~and~~

~~identifying vertices and arc parameters of the phoneme lattice for the input speech signal~~.

4. (Previously Presented) The method of claim 1, wherein the first score and the second score comprise a score based on phoneme acoustic models and language models.

5. (Original) The method of claim 1, wherein searching the phoneme lattice comprises:

receiving a phoneme lattice;

traversing the phoneme lattice via potential paths;

computing a score for a traversed path based on at least one of a phoneme confusion matrix and a plurality of language models; and

modifying the score for the traversed path.

6. (Original) The method of claim 5, wherein modifying the score comprises adjusting the score by at least one of the following: allowing repetition of phonemes and allowing flexible endpoints for phonemes in a path.

7. (Original) The method of claim 1, wherein determining the processing result comprises determining at least one of the following: at least one candidate textual representation of the input speech signal and a likelihood that the input speech signal contains targeted keywords.

8-14. (Cancelled)

15. (Currently Amended) A method for distributing speech processing, comprising:

receiving an input speech signal by a client;

constructing a phoneme lattice for the input speech signal by the client;

determining vertices and arc parameters of the phoneme lattice for the input speech signal;

transmitting the phoneme lattice from the client to a server; and

searching the phoneme lattice to produce a result for the input speech signal for the purpose of at least one of recognizing speech and spotting keywords, in the input speech signal;

wherein constructing the phoneme lattice includes:

segmenting an input speech signal into frames,

extracting acoustic features for a frame of the input speech signal,

determining K-best initial phoneme paths leading to the frame based on a first score of each potential phoneme path leading to the frame, and

calculating a second score for each of the K-best phoneme paths.

16. (Cancelled)

17. (Currently Amended) The method of claim 15, wherein determining vertices and arc parameters of the phoneme lattice comprises further comprising:

clustering together K-best initial phoneme paths for at least one consecutive frame; and

selecting M-best refined phoneme paths among the clustered phoneme paths based on second scores of these paths; and

identifying vertices and arc parameters of the phoneme lattice for the input speech signal.

18. (Previously Presented) The method of claim 15, wherein the first score and the second score comprise a score based on phoneme acoustic models and phoneme language models.

19. (Original) The method for claim 15, wherein searching the phoneme lattice comprises:

receiving a phoneme lattice;

traversing the phoneme lattice via potential paths;

computing a likelihood score for a traversed path based on at least a phoneme confusion matrix and a plurality of language models;

modifying the score for the traversed path; and

determining a search result for the input audio signal based on the modified score of each searched path.

20. (Original) The method of claim 19, wherein modifying the score comprises adjusting the score by at least one of the following: allowing repetition of phonemes and allowing flexible endpoints for phonemes in a path.

21-23. (Cancelled)

24. (Previously Presented) A speech processing system, comprising:

a phoneme lattice constructor to construct a phoneme lattice for an input speech signal;

a phoneme lattice search mechanism to search the phoneme lattice for the purpose of at least of recognizing speech and spotting keywords, in the input speech signal;

a plurality of models for lattice construction; and

a plurality of models for lattice search;

wherein the phoneme lattice constructor includes:

an acoustic feature extractor to segment the input speech signal into frames and to extract acoustic features for a frame,

a phoneme path estimator to determine K-best initial phoneme paths leading to the frame,

a global score evaluator to determine M-best refined phoneme paths based on a cluster of K-best paths of at least one consecutive frame, and

a lattice parameter identifier to identify lattice vertices and arc parameters based on M-best refined phoneme paths of each frame.

25. (Cancelled)

26. (Original) The system of claim 24, wherein the plurality of models for lattice construction comprise a plurality of phoneme acoustic models and a plurality of language models.

27. (Original) The system of claim 24, wherein the plurality of models for lattice search comprise a phoneme confusion matrix and a plurality of language models.

28-36. (Cancelled)

37. (Currently Amended) An article comprising: a machine accessible medium having content stored thereon, wherein when the content is accessed by a processor, the content provides for processing a speech signal by:

receiving an input speech signal;

constructing a phoneme lattice for the input speech signal;

determining vertices and arc parameters of the phoneme lattice for the input speech signal;

searching the phoneme lattice to produce a likelihood score for each potential path; and

determining a processing result for the input speech signal based on the likelihood score of each potential path;

wherein constructing the phoneme lattice includes:

   segmenting an input speech signal into frames,

   extracting acoustic features for a frame of the input speech signal,

   determining K-best initial phoneme paths leading to the frame

based on a first score of each potential phoneme path leading to the

frame, and

   calculating a second score for each of the K-best phoneme paths for the

frame.

38. (Cancelled)

39. (Currently Amended) The article of claim 37, <u>wherein determining vertices and arc parameters of the phoneme lattice comprises</u> ~~further comprising~~:

   clustering together K-best initial phoneme paths for at least one

consecutive frame; <u>and</u>

   selecting M-best refined phoneme paths among the clustered phoneme

paths based on second scores of these paths~~; and~~

   ~~identifying vertices and arc parameters of the phoneme lattice for the input~~

~~speech signal~~.

40. (Cancelled)

41. (Original) The article of claim 37, wherein content for searching the

phoneme lattice comprises content for:

   receiving a phoneme lattice;

   traversing the phoneme lattice via potential paths;

   computing a score for a traversed path based on at least one of a

phoneme confusion matrix and a plurality of language models; and

   modifying the score for the traversed path.

42. (Original) The article of claim 41, wherein content for modifying the score comprises content for adjusting the score by at least one of the following: allowing repetition of phonemes and allowing flexible endpoints for phonemes in a path.

43. (Original) The article of claim 37, wherein content for determining the processing result comprises content for determining at least one of the following: at least one candidate textual representation of the input speech signal and a likelihood that the input speech signal contains targeted keywords.

44-50. (Cancelled)

51. (Currently Amended) An article comprising: a machine accessible medium having content stored thereon, wherein when the content is accessed by a processor, the content provides for distributing speech processing by:

 receiving an input speech signal by a client;

 constructing a phoneme lattice for the input speech signal by the client;

 determining vertices and arc parameters of the phoneme lattice for the input speech signal;

 transmitting the phoneme lattice from the client to a server; and

 searching the phoneme lattice to produce a result for the input speech signal for the purpose of at least one of recognizing speech and spotting keywords, in the input speech signal;

 wherein constructing the phoneme lattice includes:

  segmenting an input speech signal into frames,

  extracting acoustic features for a frame of the input speech signal,

  determining K-best initial phoneme paths leading to the frame based on a first score of each potential phoneme path leading to the frame, and

  calculating a second score for each of the K-best phoneme paths.

52. (Cancelled)

53. (Currently Amended) The article of claim 51, <u>wherein determining</u>
<u>vertices and arc parameters of the phoneme lattice comprises</u> ~~further comprising~~:
    clustering together K-best initial phoneme paths for at least one
consecutive frame; <u>and</u>
    selecting M-best refined phoneme paths among the clustered phoneme
paths based on second scores of these paths~~; and~~
    ~~identifying vertices and arc parameters of the phoneme lattice for the input~~
~~speech signal~~.

54. (Cancelled)

55. (Original) The article for claim 51, wherein content for searching the
phoneme lattice comprises content for:
    receiving a phoneme lattice;
    traversing the phoneme lattice via potential paths;
    computing a likelihood score for a traversed path based on at least a
phoneme confusion matrix and a plurality of language models;
    modifying the score for the traversed path; and
    determining a search result for the input audio signal based on the
modified score of each searched path.

56. (Original) The article of claim 55, wherein content for modifying the
score comprises content for adjusting the score by at least one of the following:
allowing repetition of phonemes and allowing flexible endpoints for phonemes in
a path.

57-59. (Cancelled)